

Translation

PATENT COOPERATION TREATY

PCT/CH2003/000768



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 03/061 WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CH2003/000768	International filing date (day/month/year) 20 November 2003 (20.11.2003)	Priority date (day/month/year) 17 October 2003 (17.10.2003)
International Patent Classification (IPC) or national classification and IPC H02M /		
Applicant ABB RESEARCH LTD		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 07 April 2005 (07.04.2005)	Date of completion of this report 23 August 2005 (23.08.2005)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

Form PCT/IPEA/409 (cover sheet) (July 1998)

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/CH2003/000768

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description:
pages _____ 1-15 _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the claims:
pages _____ 2-21 _____, as originally filed
pages _____ 1 _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☒ the drawings:
pages _____ 1/7-7/7 _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/CH 03/00768

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-21	YES
	Claims		NO
Inventive step (IS)	Claims	1-21	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-21	YES
	Claims		NO

2. Citations and explanations

This report makes reference to the following document:

D1: US5737201

Document D1 is considered to constitute the prior art closest to the subject matter of claim 1 and discloses (the references in parentheses are to that document):

a converter circuit for connecting a plurality of switching voltage levels, having n first switching groups (CL1, ..., CL n) for each phase (-), The (n)th first switching group (n) comprises a first power semiconductor switch (IA1) and a second power semiconductor switch (IB1) and each of the initial first switching groups (1), up to the ($n-1$)th switching group ($n-1$), comprises a first power semiconductor switch (IA1), a second power semiconductor switch (IB1) and a capacitor (C1-C($n-1$)) connected to the first and second power semiconductor switches (IA1, IB1). Each of the n first switching groups (1, ..., n) is connected to the adjoining first switching group (1, ..., n), forming a chain, while the first and second power semiconductor switches (IA1, IB2) of the initial first switching groups (1) are interconnected, the converter

circuit being characterised in that $n \geq 1$ and... (features which are not disclosed in D1).

The subject matter of claim 1 thus differs from the subject matter known from D1 in that

- p second switching groups (5.1, ..., 5.p) and p third switching groups (6.1, ..., 6.p) are provided. Each of them comprises a first power semiconductor switch (2) and a second power semiconductor switch (3), as well as a capacitor (4) connected to the first and second power semiconductor switches (2, 3); and $p \geq 1$. Each of the p second switching groups (5.1, ..., 5.p) is connected to the adjoining second switching group (5.1, ..., 5.p), forming a chain. Each of the p third switching groups (6.1, ..., 6.p) is connected to the adjoining third switching group (6.1, ..., 6.p), forming a chain. The initial second switching group (5.1) is connected to the first power semiconductor switch (2) of the nth first switching group (1.n). The initial third switching group (6.1) is connected to the second power semiconductor switch (3) of the nth first switching group (1.n), and the capacitor (4) of the pth second switching group (5.p) is connected in series to the capacitor (4) of the pth third switching group (6.p).

The subject matter of claim 1 is therefore novel (PCT Article 33(2)).

The present invention can therefore be considered to address the problem of reducing the electrical energy stored and thus the requisite voltage resistance and/or capacity of the capacitors (page 4, lines 1-4, of the description).

The solution to this problem, as proposed in claim 1 of the present application, involves an inventive step (PCT Article 33(3)) for the following reasons: the special features of claim 1 cannot be found in any of the remaining prior art documents.

Claims 2-21 are dependent on claim 1 and thus also meet the PCT novelty and inventive step requirements.

The use of the expression "forming a chain" in claim 1 appears to be unclear (PCT Article 6)

A study of the figures makes it possible to understand why the connection structure can be described as "forming a chain", but the expression "forming a chain" does not mean or exclude with certainty any type of connection structure.